

```
SCAL IN
SCAL 62H
RST 18H:DEFB 62H
DF 62
```

IN scans the devices in the input table once. If an input is detected from any device, the routine returns with the input data in register A and the Carry flag set. Otherwise the Carry flag is reset.

```
SCAL INLIN
SCAL 63H
RST 18H:DEFB 63H
DF 63
```

INLIN blinks the cursor and displays input from any of the devices in the input table. When the Enter code is received (normally from the keyboard Enter key), the routine returns with register pair DE holding the address in video ram of the start of the line in which the cursor was when the Enter code was received.

```
SCAL KBD
SCAL 61H
RST 18H:DEFB 61H
DF 61
```

KBD scans the keyboard once. If a key press is detected, the routine returns with the ASCII code for the key in register A and the Carry flag set. Otherwise the Carry flag is reset.  
Using the shift, control, and graphics keys of the NASCOM 2 keyboard all 256 codes may be generated from the keyboard.

The contents of workspace location \$KOFT (0C27) control the characteristics of the keyboard as follows:

\$KOFT	Keyboard characteristic
0	Shift key produces lower case characters.
1	Shift key produces upper case characters.
4	Effect of Graphics key is reversed: keys produce graphics characters unless Graphics key is pressed when alphanumeric characters are produced.
5	Combines the effect of 1 and 4.

The Kn command may be used to set the contents of \$KOFT to n.

KBD should be used in preference to RIN to input from the keyboard whenever a spurious input from the serial port would be undesirable. To wait for a keyboard input use the following:

	PUSH ???	Save active registers.	
DF 61	KBDW	SCAL KBD	Scan keyboard
30 FC		JR NC,KBDW	If no keypress, JUMP.
		POP ???	Restore registers.

See also RKBD.

---

SCAL MFLP
SCAL 5FH
RST 18H:DEFB 5FH
DF 5F

MFLP changes the state of bit 4 of output port 0. This port is used primarily to drive the keyboard and the single-step logic; bit 4 is used to drive LED2 which illuminates when the cassette recorder should be switched on during commands G,R,V, and W. It is possible to use this signal, available at TP10 on Nascom2) to switch a cassette, having a remote control plug, on and off.

---

SCAL MRRET
SCAL 5BH
RST 18H:DEFB 5BH
DF 5B

MRRET is the normal return from a user program back to NAS-SYS. It resets the top of the monitor stack and sets the user stack top to 1000H, displays the logo "--NAS-SYS n --", resets the breakpoint byte, and then waits for a keyboard command.

---

SCAL NIM
SCAL 72H
RST 18H:DEFB 72H
DF 72

NIM changes the start of the table of input device handlers to the location pointed to by register pair HL. Thus to use an input table which starts at location INDEV,  
Program: 21 xx xx LD HL,INDEV  
DF 72 SCAL NIM

On exit register pair HL holds the address of the start of the input table in use before calling this routine.

See also commands U and X in chapter 2 and routines NOM, NNIM, and NNOM in this section.

## A Guide to NAS-SYS

```
SCAL NOM  
SCAL 71H  
RST 18H:DEFB 71H  
DF 71
```

NOM changes the start of the table of output device handlers to the location pointed to by register pair HL. Thus to use an output table which starts in location OUTDEV, program:

```
21 xx xx LD HL, OUTDEV  
DF 71 SCAL NOM
```

On exit register pair HL holds the address of the start of the output table in use before calling this routine.

See also commands U and X in chapter 2 and routines NIM, NNIM, and NNOM in this section.

```
-----  
SCAL NNIM  
SCAL 78H  
RST 18H:DEFB 78H  
DF 78
```

NNIM sets the start of the table of input device handlers to location INT1 within NAS-SYS3. This table contains RKBD and SRLIN in NAS-SYS 3; KBD and SRLIN in NAS-SYS 1.

On exit register pair HL holds the address of the start of the input table in use before calling this routine.

See also commands U and X in chapter 2 and routines NIM, NOM, and NNOM in this section.

```
-----  
SCAL NNOM  
SCAL 77H  
RST 18H:DEFB 77H  
DF 77
```

NNOM sets the start of the table of output device handlers to location OUTT1 within NAS-SYS 3. This table contains CRT only.

On exit register pair HL holds the address of the start of the output table in use before calling this routine.

See also commands U and X in chapter 2 and routines NIM, NOM, and NNIM in this section.

```
-----  
SCAL NUM  
SCAL 64H  
RST 18H:DEFB 64H  
DF 64
```

NUM converts a number, expressed as up to four ASCII codes, into

## A Guide to NAS-SYS

hexadecimal.

On entry, the start of the number (which may be preceded by spaces) is pointed to by the contents of register pair DE. On exit, workspace location NUMV (0C21/2) holds the hexadecimal form of the number and NUMN (0C20) holds the number of hexadecimal digits in the number.

e.g. If the number is 1E9 (stored as 31H,45H,39H), after calling NUM, NUMV/NUMV+1 holds 01E9H and NUMN holds 03, the number of digits.

The Carry flag is set if an invalid character is encountered.

```
RST PRS  
RST 28H  
EF
```

PRS outputs a string of bytes to the devices in the output table. The string of bytes must follow immediately after the call to PRS, and the string must be terminated with byte 00H.

e.g. EF RST PRS  
46 72 65 64 DEFM /Fred/  
0D 00 DEFB 0DH,0 Newline and  
terminator.

Since the output table normally contains CRT and SRLX, the bytes appear on the display as Fred followed by a newline, and the bytes 46,72,65,64, and 0D are transmitted from the serial output port.

Note that screen editing commands may be incorporated into the strings,

e.g. EF RST PRS  
0C 00 DEFB 0CH,0 clears the screen.  
  
EF RST PRS  
1B 00 DEFB 1BH,0 clears the line in which the  
cursor lies.

```
RCAL disp  
RST 10H:DEFB disp  
D7 disp
```

RCAL disp produces a call to a subroutine in a similar manner to the Z80 instruction CALL address. However, whereas the CALL instruction requires the absolute address of the CALLED subroutine to be encoded within the instruction, RCAL requires that the relative displacement of the subroutine be encoded in the same manner as the Z80 JR (Jump Relative) instructions. Thus it may be regarded as a Relative CALL.

As in all the instructions using a relative address, the displacement (disp) must be evaluated bearing in mind that the

## A Guide to NAS-SYS

actual address referred to is the current program count plus the displacement, ie PC + 2, and that the PC holds the address of the next instruction. Thus,

0643 D7 15 RCAL 15H

produces a call to the subroutine beginning at 065A, since  
0643 + 2 + 15 = 065A.

The advantage gained by using RCAL is that the machine code may be relocated anywhere in memory, ie. it is position independent code. The price paid is the extra processing time taken by RCAL to evaluate the required address.

---

RST RDEL  
RST 38H  
FF

RDEL generates a delay proportional to the number stored in register A. (00 in register A is interpreted as 256.) The delay produced by this routine itself, excluding the delay in calling it, is  $44 * (\text{contents of reg A} - 1) + 17$  clock cycles. If the Z80 clock is 2MHz, each cycle takes 500 ns. Thus delays between 8.5 microseconds and 5.62ms may be produced. If the clock frequency is 4MHz, the delay times are halved.

See also TDEL.

---

RST RIN  
RST 08H  
CF

RIN repeatedly reads in turn all the input devices in the input table until an input is detected from one of them. On returning, the input byte is in register A and the Carry flag is set.

The routine itself calls routine IN repeatedly until an input is detected.

NAS-SYS 3 only.

SCAL RKBD  
SCAL 7DH  
RST 18H:DEFB 7DH  
DF 7D

RKBD is the keyboard driver which supports repeating keys, ie. a key held down for longer than a certain period will be regarded as having been pressed again and again. (The @ key does not repeat since it functions as a CTRL key.)

Two periods are involved: the initial period for which a key must be held down before it is regarded as being pressed again, and the period which determines the repeat speed after the initial period.

The initial period is determined by workspace location KLONG (0C2E/F), and is set by NAS-SYS to 0280H.

The repeat speed is determined by workspace location KSHORT (0C30/1), and is set by NAS-SYS to 0050H. Either or both of KLONG and KSHORT may be changed by the user.